SECOND ANNUAL REPORT

OF THE

COAL MINE INSPECTORS

OF THE

STATE OF WASHINGTON.

FOR THE YEAR ENDING DECEMBER 31, 1891.

OLYMPIA, WASH.:
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SEATTLE, WASH., January 26, 1892.

Hon. ALLEN WEIR, *Secretary of State, Olympia, Wash.:*

SIR — In compliance with the provisional statute, I have the honor to present you with my annual report for the year ending December 31, 1891, of the coal mines of the first district (formerly called the second district) of Washington.

Respectfully,

ED. T. MORGAN,

Coal Mine Inspector First District.

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INTRODUCTION.

The state has been divided into two coal mine inspection districts, namely, the first and second, by "An act relating to the proper ventilation and safety of coal mines, and prescribing the manner of appointing of inspectors," approved March 5, 1891.

The first inspection district comprises the following counties: Whatcom, San Juan, Skagit, Island, Snohomish, King, Okanogan, Kittitas, Douglas, Stevens, Lincoln, Spokane, Adams and Whitman; the second inspection district, the counties of Clallam, Jefferson, Kitsap, Chehalis, Mason, Thurston, Pacific, Wahkiakum, Pierce, Lewis, Cowlitz, Skamania, Clarke, Yakima, Klickitat, Franklin, Walla Walla, Columbia, Garfield and Asotin.

I had the honor of being appointed under the territorial law, which was passed in 1887–8, as coal mine inspector of the second district, which is now, under the law of 1891, the first district. In a conversation I had at the state auditor's office, I was informed that during my term of office the new law did not touch my case regarding residence, bonds or emoluments; but would, in spirit and in letter, affect whosoever should be appointed as my successor. I consider myself in duty bound to make this explanation, to show why the inspector's report of the second district was written in the first.

REPORT.

THE TACOMA EXPOSITION.

The cross-sections of coal veins, and their analysis, as shown at the Tacoma exposition, was an important feature in displaying the resources of the State of Washington.

The difference in thickness of the various coal veins, and the formation of alternate layers of coal, bone, slate and clay, was a very interesting object lesson to all visitors, whether mining men or otherwise. If the product of a coal vein was put into the market without undergoing the process of separating and cleaning, the public in general would be justified in raising a howl at the great and gross injustice done to all consumers of this important commodity.

FIRST COAL MINING IN WASHINGTON.

The man who claims the honor of opening the first vein of coal in King county, and of bringing the first load of it into Seattle to sell, is Mr. W. W. Perkins, and widely known among the earliest settlers as "Walla Walla" Perkins. Talking upon the subject some time ago to a *Post-Intelligencer* correspondent, he said:

"I arrived at Seattle in 1858, and went jobbing around at one thing and another, doing a little machine and steamboat work and suchlike for several years.

"In the fall of 1862, while at work in a small foundry, L. B. Andrews came into the shop with several lumps of coal done up in a flour sack. He told me he had found it out in Squak (Issaquah), and wanted to know if the stuff was any good. I tested the coal, and told him it was first rate.

"He then proposed that I should go out and look at the vein. I did so, and we made an agreement to work together. The land is situated about where the Gilman mines now are. It was unsurveyed, and he went ahead at once and located a preëmption claim of 160 acres, of which I was to have forty acres to work myself. I proceeded immediately to develop the vein, with a crew of four or five men.

"That winter we took our first load, 350 tons of coal, into Seattle, and it was purchased by the storekeepers and the steamboats then plying on

the Sound. I remember that the government steamer Shubrick was then in port and took about forty tons of the coal, the captain being mighty glad to obtain it. To get it into town we had to haul it with teams a mile and a half to Samamish lake, then by scow along Squak slough to Lake Washington. On the shore of the lake (about where the Casino is located) it was landed by the scow, and then teamed again into Seattle. The first lot brought $22 per ton, and that price was maintained for about a year; then it dropped to $18, and kept going down until six months later all I could get was $12 a ton.

"This rate did not pay, as the cost of transportation was heavy, and I quit delivering coal after eighteen months at the business. During the time that I was operating the mine I built a coal bunker on Yesler's wharf. It was the first one in use, and had a capacity of 150 to 200 bushels. The Yesler mill was rather a primitive concern in those days, one interesting feature of it being the manner of getting rid of the sawdust. An employé named "Dutch Ned" used to carry all such refuse out in a box on his back and dump it 'most anywhere, very often using it to fill up holes in the streets.

"Seattle was only a trading post when the coal business began. There were probably 300 people there. The business of the town comprised four stores, owned respectively by H. L. Yesler, Doc. Williamson, Charles Plummer and S. B. Hinds. Three saloons flourished. Of the churches, I remember Rev. Dan. Bagley conducted the Methodist, and Rev. Father Prefontaine the Catholic.

"The only newspaper, the Seattle *Gazette*, was run by J. P. Watson. He was a good fellow, and I recolleet giving him a barrel full of the first lot of coal free of charge. I don't suppose he could have paid for it anyhow, but I liked his style.

"After quitting the first coal mining venture and abandoning the claim, I went over to the New Castle mines, where somebody had struck the mineral, and I obtained two elaims in that section—320 acres. I made very little out of the speculation, as I sold the land to a corporation which had agreed to develop the claim. I received twelve shares of the stock. The whole concern was sold off before coal was taken out. It was a game of freeze out, and I wasn't in it."

Bellingham Bay mine, at Sehome, Whatcom county, was the first mine of note developed in Washington. The mine has not been in operation for several years, and is now full of water. Coal was shipped from this mine in 1860. The mine consisted of a slope, sunk very near the bay, on an angle of from eight to thirty-six degrees. The whole thickness of the vein was fourteen feet, of which it is claimed to contain ten feet of clean coal, a lignite. The west gangway of the first level was abandoned before it had been worked to any extent, fearing the water in the bay would break in. The gangway running west on the third level was worked more extensively. When in operation, everybody seemed

to be in dread of the water; but after operating the mine for nearly eighteen years, spontaneous combustion caused the mine to be flooded, and it was never re-opened. The mine yielded some 250,000 tons in all.

New Castle mine was the first mine of note operated in King county. Mining was first done here late in the sixties; and about the year 1870 a track was laid from the mine to Lake Washington, near what is now called Murphy's landing. Here the coal was loaded on scows and taken through the slough at the southern end of the lake into Black river, thence along the Duwamish river into Seattle. Some time elapsed, then the scows, carrying the mine cars, were towed to the northwest end of the lake, and transferred along the portage to other scows on Lake Union; arriving at the southern end of the lake, the coal cars were run over a track to the terminus at Pike street, and dumped into a bunker, from which the vessels were loaded. This mode of transportation was continued until the completion of the narrrow gauge railroad, connecting Seattle and the New Castle mine, in 1878.

DESCRIPTION OF MINES IN OPERATION.

GILMAN MINE.

This mine consists of a slope sunk on No. 1 vein to a depth of 410 feet, and on an agle of twenty-five degrees. The east side gangway at this depth was driven about 500 feet, and when under the Issaquah (pronounced Squak) creek the water broke through from the surface, owing to the fact that the overhanging wall, or top, was of a soft and yielding soapstone. The coal vein was in place and of good quality, but the covering being of a very porous nature, the result was as above stated.

A bulkhead constructed near the face of the gangway has kept the water at bay, and preparations for a permanent brick stopping in the form of the segment of a circle has been made. Mining has been suspended on this side. On the west side about twenty or more breasts have been opened, with a doghole or air course some ten or twelve feet below level of gangway, so as to carry the air in an unbroken volume to last cross-cut from face of gangway. The doghole is the inlet and the breasts and cross-cuts act as the outlet.

Quite a difference will be accomplished in the quantity of air by enlarging the main outlet under the fan to an area of 59.5 square feet. These changes are now under construction.

The fan in use is an exhaust, and partly modeled after the Guibal fan.

NO. 4 VEIN.

This is a water level opening, and at the present time is nearly worked out. The ventilation is produced by a furnace. During my last visit to this mine there were thirty-five men and boys employed, and two mules.

Three other water level openings have been in operation at this mine, namely, tunnels No. 1, No. 2 and No. 6 (or Andrews' vein), but neither has been worked for a long time.

The company may possibly drive rock tunnels from the slope to tap those veins which lie north and south of the slope. I omitted stating that another lift is to be opened in the slope below the 400-foot level. The new opening is now down 300 feet. A new

Cameron pump is placed in the slope for drainage. Hoisting is done by a pair of double engines. Steam is generated by two tubular boilers. A certified copy of the good condition of the same has been duly received.

KANGLEY MINE.

This mine is opened on section 26, township 22, range 7, east, some four or five miles north of Palmer station, on the Northern Pacific Railroad. It consists of a slope which is now down 1,350 feet, and will be continued to a depth of 1,500 feet. At the depth of 400 feet two gangways were opened — one to the north and one to the south. The latter has been driven quite a distance and nine breasts opened. The north gangway was driven a short distance beyond the air course, which is the main inlet for ventilation. Near this point the air current is split, the first portion ventilating the upper south gangway and breasts by means of an air bridge crossing the slope. I found an ample supply of air coursing the face of each breast.

The means adopted for ventilating the slope while sinking are as follows: As the slope is sunk, a cross-hole is driven from the slope horizontally to the required distance; from thence the air course is worked up the pitch on the angle of the vein, to connect with the last section at the cross-hole above. In this way the air course is driven in sections every fifty feet, and by the time the last section is completed the slope is down far enough to begin a new section. This mine produces quite a quantity of gas (CH^4).

Drainage has been accomplished by means of a small steam pump, placed at the side of the slope. A new Deane pump will soon be placed in the north gangway, where all the surface water can be collected, thereby avoiding its running down below the 400-foot level.

Ventilation is produced by an eight-inch cyclone fan, forcing the air down the inlet, as before mentioned.

The management contemplates driving a second opening from the face of the south gangway direct to the surface; and, in addition to its being an escapement shaft, it can be used as an outlet for the volume of air circulating through this level.

Hoisting is done by means of a new pair of double engines, constructed with loose drums and clutches. The engine house is substantially built of brick, with corrugated iron for roofing. The

boiler house is also finished in the same substantial manner, with a very high brick chimney.

Steam is generated by two tubular boilers, fully equipped with water gauges, steam gauges and safety valves. A certified copy of the good condition of boilers duly received.

ALTA MINE.

This mine is situated near the Kangley mine, and opened on section 36, township 22, range 7, east. It consists of a slope sunk 300 feet on an angle from eight to fifteen degrees.

Only one gangway, going south, has been opened. It is driven about 230 feet. Two breasts have been opened. The vein seems to have been disturbed by volcanic action. The coal in the breasts did not show up as good as it did in the gangway.

Drainage is accomplished by means of a water car, filled and hoisted as occasion demands. Ventilation is effected by means of a water wheel, connected with belt to a small fan, the air being conducted down the mine through wooden pipes. The one ventilating the gangway is 6x6 inches in size.

Hoisting is done by means of a pile-driver engine, with vertical boiler.

DURHAM MINE.

This mine has been idle since my appointment. I have accompanied Mr. Joshua Bagnell, whom I found in charge of the place, through two openings, which I found as follows:

There are two tunnels opened on section 2, township 21, north, range 7, east, three miles from Palmer.

No. 1. This is driven in 1,350 feet. Average thickness of vein is eight feet; number of breasts opened sixteen.

No. 2 has been driven 1,150 feet, with eight breasts opened. Average thickness of vein is eight feet.

The two tunnels are (or were) ventilated by an exhaust fan, placed midway between the openings. The fan is of the Guibal style, twenty-one feet diameter, six feet wide, one side opening, with blades curved backward.

This mine generated gas.

BLACK RIVER MINE.

This mine has not been worked during the year. It consists of a small slope 207 feet below water level.

The vein, which is from four to five feet thick, lies at an angle varying from eight to thirty degrees.

SNOQUALMIE MINE.

Quite a number of veins have been prospected at this place, and the management contemplates opening a large mine, and erecting a number of ovens, to enable them to ship coke of a No. 1 quality direct from the mine.

A branch of the Northern Pacific Railroad has been partially completed to this mine, from the Kangley mine, but for some reason operations have been suspended entirely. All the openings at the mine are above water level.

ROSLYN MINE.

This consists of three distinct and separate openings; but a man employed at either of these places, if he crosses the Cascades to Western Washington, hails from Roslyn. These mines are owned and operated by the Northern Pacific Coal Company. The general manager is Mr. John Kangley, who invented and has built a number of "Cyclone fans" in this district.

ROSLYN NO. 1.

The water level workings were exhausted before I paid my first visit there. No. 1 is therefore confined to the slope, which is now down to a depth of 2,700 feet, as per accompanying diagram.*

As the slope descended, entries were opened at intervals of 350 feet to the east and west. There are now four entries opened on each side, and not a single room worked. In each entry, at a distance of fifty feet from the slope, traveling roads are opened, connecting all the levels to the third, and others will be completed in due time. This forms an ingress and egress to the men and mules on each particular side without coming near the hoisting slope. In the near future the foot of this slope will be connected to a large shaft, soon to be sunk, thereby having two separate openings to a mine containing sixteen to eighteen entries, with an unlimited territory. Drainage is effected at present by a pump placed at the side of the slope. Ventilation is produced by a new ten-foot "Cyclone fan." The outlet for this fan has been changed from an elevation to a point level with the air course, which materially

*Diagram omitted from printed report.

adds to the effectiveness and increase of the volume of air. Hoisting is done by a double engine, as shown in diagram.*

ROSLYN NO. 2.

This mine has two openings for drawing coals (independent of the manway for the convenience of men and mules), called respectively water level and main rope entry.

This mine is opened very extensively, and consists of a dip entry, first level, second level, third level, fourth level, third east, second east, and first east, which has been worked out, though used as an in-take for a separate split of air at the present. The second east is also used as another separate in-take. In all there are four in-takes, namely, the first and second east, likewise the water level and manway. This is the largest producing mine in this district. In October, 1891, it produced 1,900 tons in ten hours.

Drainage is effected by a small pump placed in the dip entry, worked by compressed air; haulage, by engines situated outside, as per plan;* ventilation, by a ten-foot Cyclone fan. Certified report of condition of boilers duly received. Six boilers produce sufficient steam for Nos. 1 and 2 mines. Great improvements have been made in those mines regarding ventilation, drainage and safety; also ingress and egress.

ROSLYN NO. 3.

This mine is situated about two miles northwest of No. 2, and opened on the same vein as Nos. 1 and 2, and consists of a rock tunnel for a distance of 500 feet, where it interseets the coal vein. All the coal mined here is brought by means of mules and gravity planes to the turn-out at bull wheel, 500 feet from mouth of tunnel, and let down to the tipple 700 feet from the mouth of tunnel.

There are four entries and four air courses on each side of main plane, running east and west.

This mine is capable of handling a large amount of coal, as shown by the mine records of October, 1891, when 1,500 tons were handled and shipped in ten hours. No pumps are used in this mine for drainage, for all is above water level. Ventilation is produced by a new Cyclone fan eight feet in diameter; haulage, by means of an engine placed outside the mouth of tunnel.

During the winter months snow falls very heavy, and it is found

* Omitted from printed report.

absolutely necessary, east of the Cascades, to resort to the use of snow sheds. At No. 3 mine snow sheds have been built from the mouth of tunnel to the tipple house. The same has been done at Nos. 1 and 2, besides the snow sheds over the railroad sidings. Last winter they had fully four feet of snow to contend with.

NEW CASTLE MINE.

This mine is situated a little over twenty miles east of Seattle. It has produced more coal than any other mine in King county. It consists of a slope, on an angle of forty to forty-one degrees, and has a depth of 1,350 feet. All coal mined here has to be hoisted from this level. A pair of hoisting engines, 24 x 34 feet, does the work; they are on first motion. An idea of the capacity of those engines may be formed when it is stated that on one day of October, 1891, over 1,000 cars were hoisted in ten hours, beside hoisting the miners in the above stated time.

A plan of the landing, etc., will accompany this report, showing the three tracks on top to facilitate the quick handling of four cars a trip, each car of fifty cubic feet capacity; or, in other words, one car in less than thirty-six seconds, traveling at a rate of thirty-seven and a half feet per second.*

The mine is ventilated by two fans. The one on the east side is of the Guibal type, fourteen feet in diameter, with one side opening. The one on the west side is a Cyclone, recently put in operation, and is ten feet in diameter. This mine has been so extensively worked, and so many pillars having been crushed by the weight of superincumbent strata (to say nothing of pillars being skipped and robbed), that it is almost an impossiblity to maintain properly constructed air courses. For the above stated reasons, I consider New Castle mine the most difficult to properly ventilate in my whole district.

Drainage is as follows: On the fourth level is a Worthington pump, forcing the water to the third level; on the third is a Cameron pump and a Deane pump, forcing the water to the second level; on the second level is a Whiting pump and a Blake pump, to force the whole product to the surface.

No. 1, or water level, extends westerly from the slope to New Castle camp. This level drains all the surface water, thereby relieving the pumps of a considerable amount of work.

*Omitted from printed report.

The first, second and third east levels were never worked out. They had to be abandoned and permanently closed, owing to fires emanating from spontaneous combustion.

The rubber hose, kept in readiness in case of fire, can be attached to the boiler pump on short notice. A 60,000-gallon tank, always full of water and built on an elevated point, commands all the outbuildings.

The slope opening is 580 feet above mean tide.

Steam is generated by ten boilers. A certified report of the good condition of same has been duly received.

CEDAR MOUNTAIN MINE.

This consists of a slope sunk on the east side of Cedar river, eighteen miles from Seattle, on the Columbia & Puget Sound Railroad. It is 500 feet deep. The first 220 feet has been sunk through rock, on a dip of thirty degrees, to intersect the coal vein, and the remaining 280 feet in coal, on a dip of seventeen degrees. The vein is about twelve feet thick.

Ventilation is poor, being produced by a very small grate, suspended in the up-cast. The quantity of fire the grate may contain is very limited. Hoisting is done by an engine placed on top of the plane leading from the slope. Steam is generated in a vertical boiler. Drainage is effected by a small pump at the foot of the slope. A certified copy of the good condition of the boiler has been received.

BLUE CANYON MINE.

This mine is situated within one mile of the south end of Lake Whatcom, on the east side, and within four and a half miles from Wickersham station, on the Seattle, Lake Shore & Eastern Railroad.

The mine is opened at an elevation 800 feet above the lake, and consists of a tunnel going east, which was in on my last visit 408 feet. It contained then but eight inches of coal. A slope has been sunk near the tunnel entrance to a depth of 400 feet, the last seventy-five feet of which was through disturbed ground. Two gangways, one east and one west, were opened in the slope, at a depth of 300 feet from the surface. In the former they have from five to seven feet of coal; in the latter they had not penetrated beyond the disturbed portion.

The disturbance runs across the slope, diagonally, from southwest to northeast.

Hoisting is done with a small engine.

Ventilation is now effected by a new fan of the Guibal pattern. This mine produces gas, and several have been slightly burned.

SKAGIT COAL & TRANSPORTATION COMPANY.

This mine is situated within six miles of Sedro, on a spur of the Great Northern Railroad. It consists of a rock tunnel, driven north, and is 1,267 feet long, and has intersected three veins.

No. 1 vein is three and one-half feet thick, and is 1,050 feet from the mouth. This vein is not worked, because of its irregularity and changeable condition.

No. 2 vein lies ninety feet north of No. 1, and has a very heavy dip, being so near vertical that one day the dip is north, another day its dip is south. On the west side of the tunnel the vein has been fifteen feet thick, and after the gangway was driven in some distance a sandstone made its appearance near the middle of the vein, and increased in thickness. That has caused two separate veins. In the northern split of No. 2 vein the management has adopted the long wall system of mining. I expect to be able to secure plans of this system of mining, to be published in this report.

No. 3 vein is twelve feet thick, and lies 127 feet north of No. 2 vein. Little development has been made in this vein. The production of this mine is coked.

A new six-foot Cyclone fan has been built. Gas is generated freely.

A certified report of the good condition of the boiler has been received.

CUMBERLAND MINE.

There has been no work done at this mine during the year. This mine is on the Skagit river, opposite the town of Hamilton. A full sized tunnel is driven into the mountain, and intersects the veins at right angles. Two veins had been cut, and driving for the third was vigorously prosecuted before suspending operations. The boring in the tunnel was accomplished by Burleigh drills, and the mountain stream utilized as the motive power, producing compressed air.

The coal is a coking coal.

THE PUGET SOUND FIRE CLAY CO.

This is located near Black Diamond, with a spur of the Columbia & Puget Railroad to the mines. This enterprise is embodied in my report from the fact that there are two or three coal veins adjoining or lying in close proximity to their fire clay deposits. All the coal they mine is used exclusively for their own purposes at the pottery, situated at Vanasselt, within six miles of Seattle. This new branch of industry has suffered terribly since the recent labor troubles in King county—mines idle, contracts canceled, hardships of employés and sacrifice of capitalists. Employment was furnished to a large number of men at the mines and pottery. The product was chiefly sewer pipe, and distributed to various places along the sound, Fairhaven in particular. During the trouble the company were in dread of assuming a proposal for several miles of sewer pipe in Victoria, B. C., the direct result of extremists.

COKEDALE.

This is a new mining camp, where prospecting is carried on on a large scale. It is situated about one and a half miles from Franklin, W. J. Williams in charge, through whose courtesy I received the following: They have on sections 8 and 17 eleven veins, eight of which are proven workable. Five are reliable, ranging from three feet six inches to thirty-one feet in thickness; dips varying from forty-eight to eighty-two degrees. Basin, or synclinal axis, runs center north and south through section 8.

Five veins are bituminous and dip east, three veins are semi-bituminous and dip west.

Operated by A. S. Dunham & Co., Green River Coal & Coke Co.

BLACK DIAMOND.

This mine consists of three slopes, called Nos. 14, 2, and 12, respectively. No. 12 slope is 1,250 feet deep, on a dip of fifteen to eighteen degrees. A new lift has been opened within the year. The management has had serious troubles, which are constanly menacing coal mining, owing to the yielding of the superincumbent strata, extending from the west gangway on the second level to the slope. Active measures were promptly taken, and the difficulties overcome. Coal mining in Washington becomes expensive when those unforseen occurrences take place. Several mines in this dis-

triet could present a more desirable balance sheet at the end of the year were things otherwise. When we consider the upheavals and internal disturbances that have taken place within the bosom of mother earth, to say nothing of the innumerable evidences left by the glacial period in the shape of erosions and drift, particularly in King, Skagit and Whatcom counties. Drainage is effected by Cameron pumps, with a good margin in case of an emergency. Hoisting is done by a single engine, second motion, with loose drums. Steam is generated by three boilers, while there are three more not in use except when repairing or examinations are done on the former ones. Ventilation is produced by a large eighteen or twenty-foot fan propelled by a direct acting engine.

No. 2 slope is 950 feet deep, and connected to No. 14 slope by a rock tunnel. All coal mined in this slope is prepared and cleaned at what is called No. 2 bunker. All water that this mine produces is conducted through a ditch in the aforesaid tunnel to slope 14. Hoisting is done similarly to that done in No. 12. Ventilation is produced by an exhaust fan.

No. 14 Slope.—The slope proper in this mine is 950 feet deep. West of this some fifteen to eighteen hundred feet, is another underground slope sunk to a depth of 400 feet, the hoisting from which is done by an electric plant (the only one in the district). The power for the electric plant is produced by a large dynamo placed outside the mine, and the current is led down the main slope and along the gangway to the head of the underground slope by means of large insulated wires.

Drainage of this mine is done by use of steam pumps; but had not the labor troubles occurred last summer, no doubt the pumps also would have been ere this operated by electricity.

Hoisting is done by a single engine and as soon as the loaded cars are landed the same are conducted to the bunker by a rope which is put up in short sections and then joined by several iron links. The cars when landed have momentum enough to run under this wire rope. The rope drops into a slot on the hind end of the car, and slips through until the iron links are taut and cannot slip through; as a consequence the rope, which is in constant motion, takes the cars along and likewise drops them at the proper place. The empties are returned by the same means.

Ventilation is produced by an exhaust fan.

These mines are extensive and have been better ventilated than any extended mine during my visits.

FRANKLIN MINE.

The main opening (at one time) of this mine was on the No. 12 vein; it consisted of a slope sunk 500 feet deep in an oblique direction to the dip of the vein. It was sunk on an angle of thirty-five degrees, thereby bringing the bottom of the slope to a level nearly to Green river. This slope has been abandoned for some time as a hoisting slope, but is now used as a return or outlet to the fan.

The main hoisting slope that is now used is sunk on a vein overlying the No. 12 vein and underlying the McKay vein. This slope is sunk to a depth of 275 feet deeper than the No. 12 slope, and is connected to the McKay vein by a rock tunnel ninety feet long. All the coal hoisted by means of this slope is conveyed to the bunkers by means of a gravity road, and the empty cars are hoisted up a short plane, and from thence run by gravity to the head of the slope back again.

There are three escapements to this mine, independent of the outlet or No. 12 slope.

An auxiliary slope has been sunk on the McKay vein, 275 feet below the bottom of the main hoisting slope, and as soon as the gangway has been driven far enough north the hoisting slope will be connected with this new level.

Drainage is effected by steam pumps near the auxiliary slope, the outlet of which is near the Green river.

Ventilation is produced by a thirty-foot Guibal fan on the north side of the fifth level; while the difference of temperature caused by the steam pump near the auxiliary ventilates the south gangway.

The sixth level is also ventilated by the same means until it is connected with the main hoisting slope. All the coal mined in the sixth level is hoisted through the auxiliary slope and dumped into a counter chute, then reloaded at the fifth level and run to the foot of the hoisting slope.

A new departure in the method of mining is in operation here, namely, mining by the long wall system. Four sets of miners are working an opening in the vein up the pitch one hundred feet wide. This they will work to the limit line of the chain pillar, thence one

hundred feet of solid coal will be left for a pillar; and if this system will be satisfactory to the management every alternate hundred feet will be worked, and the remainder can be taken out when the limit line is reached, thereby insuring their gangways from a "creep."

This mine has been seriously affected from time to time by the yielding strata which overlies the coal, causing great expense to the company, besides throwing large numbers of men out of constant employment.

THE WASHINGTON COAL COMPANY.

The property of this company has not yet been properly developed. It is about midway between Gilman and Cedar Mountain. The croppings of some of the veins show up very good, while others are not quite up to the same standard.

RENTON AND TALBOT MINES.

These mines are situated at Renton, twelve miles from Seattle, and have not been operated since 1886. The slope has been dug to a depth of three lifts. The total output of these mines, previous to their abandonment, was 35,000 tons.

RAGING RIVER.

Considerable prospecting has been done at this place, and, although several veins were stripped, none were considered workable.

GRAND RIDGE.

Operations were abandoned at this place in March, 1889.

SHERWOOD.

This is a new place in Maple Valley, of which little more can be said than that prospecting has been carried on for about one year. A trial slope has been sunk some distance, and it is claimed that the coal is of good quality.

GENERAL REMARKS.

I do not wish to convey an idea that all the mines mentioned in this report are perfect and absolutely safe; no mine can be classified as such; and would furthermore say, that when a man enters the best conducted mine in the world his safety is in his own keeping.

Since my appointment I have not been the means of furnishing

items for the newspapers for several reasons. Some persons are inclined to blame me for this, and seem to think I have been a passive spectator, rather than an active disturber to the detriment of employer and employé. But the fact remains, that by using judgment, founded on common sense, I have in not one single instance failed to convince any mine superintendent to meet the requirements of all necessities. No less than eight new fans have been built during my first sixteen months service.

Representatives of all employers, likewise all employés, gladly received me whenever my visits caused me to mingle with them. A cordial grasp, and a few pleasant remarks prefaced my presence in each and every camp from Roslyn in the east to Blue Canyon in the northwest.

I have had occasion in many instances to differ with parties I came in contact with, but it was done from pure motives.

Hoping my successor will be treated by all as I have been treated, I shall commend him to the good graces of employers and employés.

FATAL ACCIDENTS, 1891.

JANUARY 6.—*Lewis Biham*, age 29, single: Killed by a fall of rock at the Kangley mine. During the sinking of the slope to a depth sufficient to turn off their first levels, an air course was driven in sections at a distance of thirty or forty feet to the slope, and parallel with it. A displacement of the vein occurred when down 100 feet, which crossed the slope diagonally. When the gangway or the first level had been driven far enough to admit of the driving the last section of air course it was in a confused strata, occasioned by the aforesaid displacement. Lewis Biham and two others were in the act of timbering the lower section of air course very near the gangway, when the rock, without any warning whatsoever, dropped, killing Biham in an instant, while the two others escaped. I examined the place carefully. Nothing had been done since the accident, and I found that it was a rock (in miners' parlance) from a "pot hole." The most practical miner in the state might have been caught in the same way. It was purely accidental.

JANUARY 6.—*Evan M. Jones*, age 42, married: He was employed with another man at No. 12, Black Diamond mine, taking down top coal. The lower portion of the seam having been previously worked four and one-half to five feet in thickness, props were stood at proper spaces to support the roof, which consisted of a tough bone about two and one-half feet thick; above this bone was a bench of coal three feet thick. To obtain this bench of coal Jones and his partner were taking out the props that the bone and coal would fall down, or be blasted down. The coal was thence picked out, leaving the bone to remain where it fell. Contrary to the usual method of taking a coal drill to loosen the head of the prop, he used a pick, the handle of which was scarcely half as long as a coal drill. When he gave the last blow with his pick, loosening the prop, the mass of bone and coal unexpectedly fell, catching him in a stretching position, before he could recover his equilibrium. The suddenness of the fall was caused by a face slip, which had not previously been observed. The accident happened at 9 A. M. He was taken home, and died from internal injuries received, at 5 P. M. the same day. I was acquainted with the deceased for the last twenty

years, and had worked with him. I always found him to be a miner of good judgment, sober and industrious.

MARCH 21.—*Thomas Davies*, age 24, single: Davies had been engaged one of a party in sinking a new slope at Franklin. The sinking of the slope was accomplished, and he with others had commenced lagging the sides of the slope as a precaution to prevent coals falling off the sides. The dip of the vein is from fifty to fifty-five degrees. When placing the upper laggings he used another to stand upon, placing one end on the sill of the road while the other end rested upon the upper portion of the side-prop beneath him. The miner who was lagging the opposite side had his back toward Davies, and *vice versa*. He heard something falling down the slope, and looking to where Davies had been working he missed him; and, as a miner, instinct and reason told him the whole story. He immediately went down the slope, to find the unfortunate man in the throes of death.

APRIL 26.—*Edward D. Comstock* (driver), age 39, married: While following his occupation at the Franklin mine, at the foot of the slope waiting for the regular complement of cars to make up the trip, a car got detached from its fastenings and rushed down the slope (which is at an angle of thirty-five degrees), and by its accelerated motion overtook Mr. Comstock before he could rush to a place of safety. His body was mangled terribly.

NOTE.—At the foot of this slope there is a gangway running south out to Green river; probably Comstock got bewildered and tried to escape the impending danger by running through the rock tunnel. Had he gone to the south side he would have reached a place of safety.

JUNE 5.—*Edward Braxton*, age 26, single: He was employed with two more men at the bottom of the same slope as where Comstock was killed; he was coupling cars. The trip had been coupled and the signal given the engineer for hoisting, which was done. When the trip was partly over the knuckle (where the resistance or strain is greatest, occasioned by the change of the line of pull), the cars got uncoupled—not breaking, but evidently from a careless fastening of the same before hoisting. Braxton, instead of seeking a place of safety on the south side when he heard the runaway cars rushing down the slope, ran in the tunnel in front of the danger. The cars overtook him and mangled him in a frightful manner.

NOVEMBER 1.—*W. L. F. Suiter* and *Chris. Allison:* The former was 36 years of age, leaving a wife and four children; the latter

was married about six weeks before his untimely death. They were with thirteen or fourteen others in the act of putting a boiler, which weighed three tons, from the edge of Lake Whatcom up to the opening of the Blue Canyon mine. The boiler was to be taken up a plane of 2,100 feet in length, varying in pitch from five to thirty degrees. The accident occurred between the edge of the lake and the foot of the plane. The method adopted was placing skids four feet apart, upon which was wooden rollers, underneath the boiler. The accident was caused by the straightening of the hook attached to the block (said hook was made of seven-eighths inch iron), letting the boiler back on an angle of thirty degrees, catching, out of the fifteen or sixteen men, the said Suiter and Allison. In conversing with some parties relative to the accident, they seem to think that inasmuch as the vertical height gained by thirty degrees is about one-half the base, that the boiler in question would create but one-half its own weight or strain upon the hook. They are in error, for by using a block of any kind there must be at least twice as much strain as the weight of the body to be moved or lifted before the resistance occasioned by the body moved can be overcome. The bodies of both men presented a pitiful sight. They were instantly killed. It was reported that another man named Chris. Christianson was also badly injured. When I visited the place after the accident I found that he was out of danger and doing well.

NOVEMBER 14.—*James Harnold*, aged 35, single: Harnold and George Taylor formed one shift out of three that worked in a coal breast at the Puget Sound Clay Works. The shift that worked from 7 A. M. until 3 P. M. had fired two shots previous to their quitting. Harnold and his partner, who worked the following shift, had to dress off the shots which had been fired by the party they relieved. The breast was up seventy-five yards above the gangway, and the vein had a pitch of forty-five degrees. While undermining the coal, which had been partly loosened, a quantity of coal and roof fell on Harnold, killing him instantly.

The men were both considered experienced miners.

The coroners of each county in which these fatal accidents occurred were duly notified. After learning the particulars attending each accident, they concluded in each case that an inquest was unnecessary, as there was no suspicion of foul play or neglect caused by others.

The particulars of each death have been described as minutely and as truthfully as a personal inquiry and investigation would admit.

We can see that a little reflection and presence of mind is an absolute necessity to all persons following coal mining as a means of livelihood; and then unforeseen conditions of things will occasionally call our attention to accidents, fatal and non-fatal.

NON-FATAL ACCIDENTS.

JANUARY 6.—*William Withrow*, miner: While following his vocation he was seriously hurt by a fall of rock at Black Diamond mine No. 14.

FEBRUARY 24.—*Edward Praston*, age 25: At Roslyn No. 3, had his leg broken by a mine car.

MARCH 11.—*Peter Canretta:* Roslyn No. 2; leg broken by a fall of rock.

APRIL 1.—*Joseph Morganda:* Roslyn No. 2; leg broken by mine car.

APRIL 3.—*Benjamin Meade:* Franklin; burned by gas; neglected building his air brattice.

APRIL 6.—*George D. Miller:* Roslyn No. 2; seriously hurt by a fall of coal.

APRIL 16.—*Dominick Aveneto:* Rosly No. 2; seriously hurt by a fall of coal.

MAY 19.—*Aaron Dotter:* Roslyn No. 3; hurt on back by a fall of slate.

JUNE 13.—*Thomas Nicholson:* Roslyn No. 1; burnt by gas.

JUNE 13.—*George Perry:* Franklin; leg broken. He was riding up the slope on front end of car; the car jumped the track; he lost his grip, and the above result happened.

JUNE 23.—*Henry Supek:* Roslyn No. 1; burnt by gas.

JUNE 26.—*Herman Daister:* Roslyn No. 1; leg broken, caught between moving cars.

JULY 6.—*John Wurcousky:* Roslyn No. 2; burnt by gas by entering another man's room.

JULY 11.—*A. Vallem:* Gilman; severely burnt, and arm broken. He was in the act of dumping a car of refuse on slack dump, which

has been on fire for many a month. The car, when going over the dump, took Vallem along, and resulted as above stated.

JULY 24.—*Fred Bernhard:* Gilman; both legs broken; riding on slope cars contrary to orders.

JULY 24.—*George Jarvis:* Gilman; fracture of shin bone; riding on cars contrary to orders. Jarvis and Bernard were violating the same rule and were hurt at the same time.

AUGUST 4.—*P. J. Commisky:* Blue Canyon; severly burnt by gas while traveling with a naked light through the outlet of water level tunnel.

AUGUST 4.—*M. E. Downs:* Blue Canyon; severely burnt by gas, same time and place as Commisky.

AUGUST 8.—*Ira Cooper:* Roslyn No. 3; left leg broken and hip dislocated.

AUGUST 27.—*Henry Robinson:* Franklin; burnt by gas while endeavoring to clear the place.

AUGUST 27.—*Luther White:* Franklin; burnt by gas while assisting Henry Robinson.

AUGUST 29.—*John J. Morgan:* New Castle; arm broken by a fall of coal.

SEPTEMBER 18.—*Adam Rupert:* Roslyn No. 3; toe mashed.

OCTOBER 5.—*Chris Vincent:* Roslyn No. 3; toe mashed.

OCTOBER 20.—*Wm. Sample:* Roslyn No. 3; arm broken, accidentally struck by his partner.

OCTOBER 31.—*Henry Cousins:* Roslyn No. 2; slightly hurt by fall of rock.

NOVEMBER 1.—*Chris Christiansen:* Blue Canyon; was supposed to be very seriously injured by the falling boiler which caused the death of Suiter and Allison, but when I visited the mine in a few days after the accident it was reported to me that he was out of danger and doing nicely.

NOVEMBER 7.—*John Fawcett:* Roslyn No. 3; hurt by a fall of rock in eighth east air course.

NOVEMBER 18.—*D. C. Johnston:* Gilman; fracture of leg caused by the falling of the safety door.

NOVEMBER 21.—*Victor Anderson:* Gilman; leg paralyzed by fall of coal on the back of his neck. He was employed in the new slope. The width of which is about eight feet and can be easily timbered and made safe, but he had neglected lagging his timbers.

DECEMBER 11.—*Wim Obie:* Roslyn No. 2; hurt by coal falling on him. Mining with no sprags set.

DECEMBER 14.—*Henry F. Miller:* Roslyn No. 2; hurt by loaded cars. While trying to drop the brakes on front cars of his trip, he slipped and fell between them.

IMPROVEMENTS AND NEW OPENINGS.

Kangley Mine.—A new Cyclone fan; a slope 1,350 feet in depth; a new hoisting plant, with boilers; a new brick engine house.

Blue Canyon.—A new Guibal fan, and a slope to the depth of 400 feet.

Gilman.—A new Guibal fan, and 300 feet of slope opening the second level.

Roslyn No. 1.—A new Cyclone fan; 1,000 feet of slope.

Roslyn No. 2.—A new Cyclone fan and a third opening.

Roslyn No. 3.—A new Cyclone fan.

Fairhaven Mine.—A new Cyclone fan; rock tunnel, intersecting three veins; a new bee-hive coke oven.

New Castle.—A new Cyclone fan.

Black Diamond No. 12.—A new level opened by 400 feet of slope.

Black Diamond No. 2.—A new level opened by 350 feet of slope.

Black Diamond No. 14.—A new level opened by 400 feet of slope, and a new electric hoisting plant.

Cumberland Mine.—A rock tunnel, intersecting two veins of coal.

TABLE NO. 1.

COAL MINED DURING THE YEAR 1891.

Name of Mine.	*Tons.*
New Castle	160,514
Franklin	44,557
Cedar Mountain	15,866
Black Diamond	111,472
Fairhaven Coal and Coke Company	1,200
Fairhaven Coal and Coke Company (coke)	50
Blue Canyon (September, October, November and December)	5,200
Blue Canyon (estimate, January to August)	2,000
Gilman	55,956
Kangley	5,544
Alta	2,000
Roslyn	331,444
Total	740,259

NOTE.—Puget Sound Clay Company use their own production.

TABLE NO. 2.

EMPLOYES.

Name of Mine.	*Inside.*	*Outside.*	*Totals.*	*Mules.*
Alta	18	8	26	1
Black Diamond No. 12	76	12	88	1
Black Diamond No. 2	41	7	48	1
Black Diamond No. 14	87	46	133	5
Cedar Mountain	40	25	65	.....
Cokedale	.....	19	19	.....
Blue Canyon	55	16	71	.....
Fairhaven Coal and Coke Company	24	11	35	1
Franklin	161	93	254	17
Gilman	159	62	221	6
Kangley	50	10	60	2
New Castle	130	92	222	21
Roslyn No. 1	34	.....	34	3
Roslyn No. 2	425	30	455	29
Roslyn No. 3	484	25	509	32
Totals	1,784	456	2,240	129

TABLE NO. 3.

Air measurements, showing the quantity displaced by fans, etc., at various mines.

Name of Mine.	*Cubic feet.*
Roslyn No. 1	47,720
Roslyn No. 2	57,600
Roslyn No. 3	23,835
Gilman	28,917
Gilman No. 4 (furnace)	7,641
New Castle (east fan)	13,117
New Castle (west fan)	25,818
Black Diamond No. 12	34,125
Black Diamond No. 2	24,480
Black Diamond No. 14	20,208
Kangley	21,570
Franklin (fifth level)	15,648
Franklin (sixth level inlet)	6,888
Fairhaven Coal and Coke Company	10,000
Alta (water wheel)	2,195
Blue Canyon	15,000
Cedar Mountain (no fan built yet)	.....

TABLE NO. 4.

Number of boilers in use, and date of certified reports received showing them to be in good condition.

Name of Mine.	*Date.*	*No.*
New Castle	December 1, 1891.	10
Franklin	December 1, 1891.	8
Cedar Mountain	December 5, 1891.	2
Roslyn	December 24, 1891.	6
Ronald No. 3	December 24, 1891.	2
Kangley	December 29, 1891.	2
Fairhaven (Skagit)	January 4, 1892.	1
Alta	January 8, 1892.	1
Black Diamond (Nos. 12, 2, 14)	January 14, 1892.	13
Puget Sound Fire Clay Company	January 15, 1892.	1
Total	.....	46

TABLE NO. 5.

CAUSES OF ACCIDENTS (FATAL).

Fall of rock	1
Fall of coal	2
Falling down slope	1
Runaway cars on slope	2
Crushed by a rolling boiler	2
Total	8

NOTE.—The last two deaths should not by right be classified as fatal accidents resulting from mining, though reported as such.

CAUSES OF ACCIDENTS (NON-FATAL).

Fall of rock	5
Fall of coal	8
Mine cars	8
Burned by gas	8
Struck by partner (accidentally)	1
By rolling boiler	1
By falling of door	1
Total	32

TABLE NO. 6.

RECAPITULATION.

Number of tons of coal mined during 1891	740,259
Number of fatal accidents	8
Average number of tons mined for each fatality	92,532
Number of non-fatal accidents	32
Average tons of coal for each non-fatal accident	23,133
Number of employes (inside)	1,784
Tons mined for each employe (inside)	414.94
Number of employes (inside and outside)	2,240
Tons mined for each employe (inside and outside)	330.47

TABLE NO. 7.

COMPARATIVE ANALYSES OF COALS.

Name of Mine.	*Fixed carbon.*	*Volatile matter.*	*Moisture.*	*Ashes.*	*Sulphur.*	*Totals.*
Black Diamond	45.11	47.19	3.11	4.58	.01	100.00
Bucoda	49.75	35.40	2.55	12.30	.....	100.00
Blue Canyon	58.90	37.70	1.30	2.10	.....	100.00
Carbonado (average of 9 veins)	58.30	30.70	1.74	9.26	.....	100.00
Cedar Mountain	37.20	41.10	13.00	8.40	.....	100.00
Centralia	43.40	39.50	4.50	12.60	.....	100.00
Fairhaven Coal Company (coke)	86.76	.....	.44	11.22	.84	.....
Franklin No. 10 vein	57.68	33.92	3.33	5.07	.....	100.00
Franklin No. 12 vein	50.78	34.63	3.66	10.93	.....	100.00
Franklin No. 14 (or McKay)	51.82	40.07	4.01	4.10	.....	100.00
Gilman No. 2	37.19	47.04	4.89	10.06	.88	99.97
Gilman No. 4	53.49	32.64	2.05	11.40	.42	.....
Gilman No. 6	52.65	31.91	12.36	3.08	.....	100.00
Hamilton	71.66	18.80	1.19	8.35	.....	100.00
Kangley	52.00	45.50	1.00	1.50	.....	100.00
New Castle No. 2	43.90	46.57	2.12	7.28	.13	100.00
New Castle No. 4	53.80	36.91	6.64	2.65	.....	100.00
New Castle (Bagley)	44.86	42.36	7.22	5.56	.....	100.00
Roslyn	59.31	30.29	3.35	6.93	.12	100.00
Snoqualmie	79.66	14.99	3.92	1.10	.33	100.00
South Prairie	59.89	34.49	2.59	3.03	.....	100.00
Talbot	50.97	34.65	11.89	2.49	.....	100.00
Wilkeson	62.87	25.56	1.87	9.70	.....	100.00
Wellington, B. C.	53.63	39.56	2.86	3.95	.....	100.00

REPORT FOR THE SECOND DISTRICT.

Hon. ALLEN WEIR, *Secretary of State, Olympia, Wash.:*

SIR—I have the honor to submit to you my annual report for the second mining district of the state of Washington for the year ending December 31, 1891.

Very respectfully yours,

WM. GRIFFITH,

Coal Mine Inspector Second District.

REPORT.

During the quarter ending December 31, 1891, I visited and inspected the following mines:

CARBON HILL COAL COMPANY,

CARBONADO, PIERCE CO.

This company was operating the following tunnels, namely, the Windgate and the Miller, and tunnels Nos. 3, 4, 6 and 7, until the recent heavy rains during the month of November, which caused this company considerable damage by reason of high water.

The high water washed away their dam, water pipes, etc., and they were obliged to operate the fans with steam power. Since that time they have abandoned tunnel No. 7; and tunnel No. 6 is not working at present, as it is being driven through a fault which cut the coal all out.

In tunnel No. 3 there is not much but prospecting. In this tunnel they have two chutes driven up to the surface and fixed for traveling ways in case of accident.

The Windgate and Miller and No. 4 are the tunnels that are producing coal at present.

This company's mines are in good condition, well ventilated and timbered, and every precaution is used to prevent accident. If employés would use the same precaution there would be fewer accidents in all mines.

I found machinery, etc., in good condition, and I have on file in my office a certificate dated December 8, 1891, signed by L. W. Davis, examiner, certifying that the six boilers of this mine were carefully examined by him and found to be in good condition, and that each is provided with a steam guage, water guage, and safety valve, as required by law.

SOUTH PRAIRIE COAL COMPANY,

BURNETT, PIERCE COUNTY.

I visited these mines and found this company operating only the lower gangway and the counter. I found the close working well

ventilated and timbered. This company added an improvement in draining this mine, during the past year, by placing a large pump at the bottom of the lower level, and one at the middle level. This makes the drainage of this mine very good. I found their traveling ways, step ladders, etc., in good condition, and also plenty of timber in the mine for the use of workmen. I found boilers, ropes, and machinery, etc, in good condition, and I have on file in my office a certificate dated October 27, 1891, signed by S. J. Bruner, examiner, that he had made careful examination of the four boilers at this mine, and that each is in good condition and provided with steam gauge, water gauge, and safety valve, as required by law.

WILKESON COAL AND COKE COMPANY.

WILKESON, PIERCE COUNTY.

This company is operating tunnels Nos. 2 and 3 only, at present. During the past year this company has had a great deal of trouble with faults and gravel, but they are now through them, and are getting their mine in good working order. I found the close working of these tunnels well ventilated, their traveling ways and escapements in good condition, and plenty of timber at hand.

The drainage of this mine is very good, and it promises in the near future to be one of the most productive mines west of the mountains on the coast; boilers, ropes and signals in good condition.

I have on file in my office, signed by P. C. Forrester, M. E., a certificate dated December 20, 1891, that he has carefully examined the one boiler at this mine, and that the same is in first-class condition, and is furnished with steam and water gauges and safety valve, as required by law.

TACOMA COAL AND COKE COMPANY.

WILKESON, PIERCE COUNTY.

I found this company operating but one gangway, namely, the Smith, and I found it in comparatively good condition. I examined the close workings, and found them fairly ventilated. The rock tunnel mentioned in my last quarterly report as being driven north from the Goodwin vein, has been driven to the vein of coal which they expeeted to reach in 100 feet, but proved to be 156 feet, and after cutting through the vein it was found to be not of

the quality for which their demands called for for the present, although the coal is of good quality, but will not coke.

Upon examination of their boilers, I found them in better condition than when here before, they having been repaired by a competent man and tested, but as yet a certificate of the same is not in my possession.

I found their machinery, ropes and pumps in good order.

NORTHWEST COAL COMPANY.

BUCODA, THURSTON COUNTY.

I found this company operating but their two south gangways, as the demand for coal is very light, and but little improvement has been made since my last report.

I found the mine in good condition, fairly ventilated and well timbered; boilers, ropes, etc., in good order.

I have on file in my office a certificate signed by John Banks, machinist, dated December 14, 1891, certifying that he had carefully examined the one boiler at this mine, and that the same was in good condition and provided with a steam gauge, water gauge and safety valve, as required by law.

THE WASHINGTON IMPROVEMENT COMPANY.

PITTSBURGH, PIERCE COUNTY.

The above mine has been leased, and will be known hereafter as Reed, Williams & Company. This mine commenced operations November 8, 1891, under control of the last named company. This mine is in comparatively good condition, but is poorly ventilated, as they have no fan as yet. The drainage of this mine is good; boilers, ropes, etc., in good condition.

I have on file in my office a certificate dated November 18, 1891, signed by W. F. Schafer, examiner, to the effect that he had carefully examined the one boiler at this mine, that the same was in good condition, and is provided with steam gauge, water gauge and safety valve, as provided by law.

FLORENCE COAL MINE.

CENTRALIA, LEWIS COUNTY.

I found but little improvement made here during the last quarter. I found the return airway on the south side of the slope, and a few doors placed inside will greatly help the ventilation of this mine.

As they have no fan, the ventilation is poor, but the mine is fairly timbered and well drained.

I found the machinery, pumps and ropes in good condition, and I have on file a certificate signed by L. H. Canfield, M. E., dated December 17, 1891, to the effect that he had carefully examined the two boilers at this mine, and that the same are in first-class condition, and each is provided with steam gauge, water gauge and safety valve, as required by law.

THE ANCHOR COAL AND DEVELOPMENT COMPANY,

KELSO, COWLITZ COUNTY.

I visited this place during the quarter, and find that this company is making preparations for handling a large quantity of coal in the near future. A large tunnel has been started and is driven a distance of 155 feet; is well timbered and in good shape.

CASUALTIES.

At Carbon Hill, Pierce county, on October 15, 1891, one John Koskinen, a miner, was found dead in chute No. 84 of tunnel No. 4, and from the findings of the coroner's jury it appears that the cause of his death was asphyxia, caused by inhaling giant powder smoke, he having returned too soon after firing a blast. The man was aged 27 years, married, and a native of Poland.

The number of fatal accidents for the year ending December 31, 1890, were 6; non-fatal, 8: total, 14.

The number of fatal accidents for the year ending December 31, 1891, were 6; non-fatal, 1: total, 7.

SUDDEN OUTBURST OF GAS IN MINES.

Under this heading arises one of those phenomena which in our judgment requires more than ordinary notice or insight, from the fact that its source is a concealed one, and when gas bursts forth it is usually with overwhelming violence, for seldom are the ventilating currents found to be sufficient to cope with the dense volume of explosive mixture evolved, making it one of the greatest dangers encountered by those engaged in mining.

It is a well known fact that hundreds of colliery employés are annually destroyed by this uncontrollable element. Notwithstanding this, however, we are of the opinion that many of these disastrous explosions have been charged to sudden outburst of gas,

when in many instances, if the facts could have been brought to light, the cause would have been found chargeable to the neglect or ignorance of those officials who were superintending the mining operations, the theory of a sudden outburst having been advanced to conceal their ignorance or guilt. But on the other hand the public and the press are always ready to go to extremes in passing judgment condemning the unfortunate mine officials, and frequently without even waiting to ascertain whether the casualty was wholly unavoidable and beyond human control, a class of mishaps to which sudden outbursts of gas belongs, hence it is very important before passing judgment on questions of such serious character that the subject should be carefully investigated and the responsibility placed where it belongs.

DISCIPLINE IN MINES.

In many instances, upon official investigation of the cause of accidents in mines, it is clearly shown that the same is due to lack of discipline.

More accidents occur from direct disobedience of orders or through carelessness than from any other cause. Mine laws alone will not bring about an immunity from accidents. If the workmen will not use every precaution to insure their own safety, the mere fact of certain laws being on the statute books will not help them. Colliery officials owe it to themselves, their employés and to humanity to enforce discipline in all cases.

All violations of mine laws and rules should be followed by a reprimand or suspension from work; and repetition of the offense should mean instant discharge.

The peculiar circumstances and changes, accompanied in many cases by sudden danger, which are constantly occurring in mines, indispensably require thorough discipline as essential to safety. Whenever the source of danger is understood and could be avoided, neglect or lack of discipline resulting in loss of life or property is inexcusable, whether it be displayed by the management or workmen.

Discipline is just as essential in a mine as in an army, where carelessness in one man may result in the death or injury of many. It is of no avail that all are careful and well disciplined but one; *all* must be subject to a rigid disciplinary system.

The careful perusal of the reports of the American and British

mine inspectors show that the major portion of the mine accidents, with attendant destruction of life and property, are due to carelessness or disobedience to orders—or, in other words, lack of discipline. The cause being known, it is the duty of those in authority to apply the remedy.

It may be impossible to wholly remedy this evil, but a strong and continuous effort should be made. Spasmodic treatment will not cure the evil. To pervert a familiar expression, "eternal vigilance is the price of safety."

OUTPUT OF COAL

In the second mining district of the State of Washington, for the year ending December 31, 1891.

Name of Company.	*No. of men employed.*	*No. of boys employed.*	*Tons.*
Carbon Hill Coal Company	350	11	161,041
South Prairie Coal Company	110	5	14,450
Wilkeson Coal and Coke Company	81	2	31,489
Tacoma Coal and Coke Company	73		30,848
Northwest Coal Company	24	2	13,385
Washington Improvement Company	8		1,100
Reed, Williams & Company	8		850
Florence Mine	20		4,350
Total	674	20	287,513

Since making this report I have received a certificate signed by Alex. Roethke, examiner, dated December 10, 1891, certifying that he examined the three boilers at the Tacoma Coal Company mine on the 22d day of October, and found them in good condition, and that each is provided with a steam gauge, water gauge and safety valve as required by law.